

HARBOUR IMPROVEMENTS.

(Copy.)

{ HARBOUR COMMISSIONERS' OFFICE,
Montreal, Dec. 2, 1853.

SIR,—In accordance with instructions from the Harbour Commissioners, I have the honor herewith to transmit for His Excellency the Administrator of the Government's consideration, a Report adopted by them on the 30th ultimo, with reference to the improvement and enlargement of the Harbour of Montreal.

The object which the Commissioners have in view in submitting this Report at present is respectfully to inquire, whether Government will aid them in the way pointed out therein, provided that the public opinion of the mercantile body of this city should be unequivocally declared in favor of the projected improvements?

I am to add, that the manner in which the Commissioners would propose to consult the opinion of their mercantile fellow-citizens would be as follows:—They would publish the Report, and such documents as they might deem it advisable to append to it, in all the leading newspapers of the city; they would also forward copies specially to the Montreal Board of Trade, and invite that body to declare its opinion thereon, by resolution.

And if its decision and the answer of Government should be favorable, the Commissioners would then draw up a new Harbour Bill for His Excellency's consideration—making certain alterations in the existing Tariff, for the purpose of correcting a few errors which crept into it in its passage through Parliament; and also of reducing the rate collected upon many descriptions of manufactured goods, as well as for the purpose of altering certain clauses of the Act, which appear to require revision.

I am to add, that the Commissioners will consider it a favor to be informed of His Excellency's views upon the subject-matter of this letter, and the Report connected with it, at the earliest possible day.

I have, &c.,
(Signed,) JOHN GLASS,
Secretary.
Hon. P. J. O. Chauveau, M.P.P.,
Provincial Secretary,
Quebec.

(Copy.)

MONTREAL, 29th Nov., 1853.

SIR,—The Harbour Commissioners having, on the 23rd Sept last, authorized me to communicate my views to them on the subject of enlarging and improving the Harbour and the best means of carrying the same into effect, I beg to place in your hands, for their information, the following Report upon the subject.

The questions to be considered in relation thereto, appear to me to resolve themselves into the following:—

First. Is it necessary to increase the accommodation for sea-going vessels in the Harbour?

Second. If it is necessary, then where is it most expedient to locate that accommodation; and of what description should it be?

Third. How can the funds required for the purpose be raised?

In reference to the first of these questions, I have no difficulty in my own mind in deciding that increased accommodation is required, and that it may be ruinous to the best interests of Montreal to delay making provision for the same until a pressure for it shall arise. We have seen the effect of past improvements on the St. Lawrence, both above and below the city. For instance, the opening of the St. Lawrence Canals was followed by an expansion of the trade with the country lying West of us, and a great reduction in the rates of freight, both upwards and downwards. Again, the improvements thus far made in the ship-channel between this City and Quebec, have been already followed by an increase of sea-going tonnage, trading with this port; and the prospect of a great future increase seems also certain, provided we can only accommodate the large craft which are already in course of construction, and spoken of, for the purpose of trading with Montreal. Let us recall to mind that the deepening of the ship-channel in Lake St. Peter to 15 feet at low water, was only completed in November, 1852, and yet, what results have we already seen flowing from it?—In the spring of the present year, several vessels made their appearance at our wharves of larger

tonnage than were ever employed before in trade with this city: I may allude more particularly to the "Sarah Mary," of about 1000 tons per register, and to the "Water Lilly" and "Bannockburn," of about 800 tons each; and later on in the season—in fact, at a period of the year when, previous to our operations in Lake St. Peter, none but small vessels could reach our harbour with their cargoes on board—we had the "Sarah Sands" at our wharves; a steamer of about 1400 tons burden.

These are gratifying facts, but yet not the most important that may be adduced with reference to the future destiny of Montreal in connection with the improvements in the navigation of the Lake and River, which are being carried on under the control and direction of the Harbour Commissioners. I would refer, with still greater satisfaction, to the facts, that many Companies and enterprising individuals are now engaged in building sailing-vessels of 700 to 900 tons burden, and steam propellers of 1750 to 2000 tons and upwards, to be employed as traders with this city in the course of the ensuing summer, some of which latter vessels, I am informed, will be about 300 feet long. Such facts alone would, in my opinion, render it imperative on us to provide Harbour accommodations on a larger scale than any that at present exist. But when we further take into consideration that it is entirely practicable to make the ship-channel between our harbour and the sea *thirty feet deep at low water*, (as proved by Mr. T. C. Keefer's report of 25th October last), and that such depth, with a minimum width of 300 feet, may be attained in about four years from the present time, and that in all probability that improvement will be carried out without faltering or delay; I say, when we take these facts into consideration, the conclusion becomes inevitable, that the largest vessels already named will henceforth prove to be the minimum size of our regular traders, that larger vessels will be employed in many cases, and that the number of all will increase from year to year, to keep pace with the development of the trade and resources of the boundless country lying on either side of the St. Lawrence, and the great inland seas above it.

If these views with reference to the prospects of Montreal be correct, and if the facts I have named with reference to vessels of large tonnage being already in course of construction to be employed next summer in trade with Montreal be well founded, as I believe them to be, then I consider it my duty as a Harbour Commissioner to press my opinion upon the notice of my Colleagues, that increased harbour accommodation is required, and that no time should be lost in asking the Government and the Legislature for authority and means to provide it.

This brings me to the consideration of the next question, viz:—Where is it most expedient to locate this new Harbour accommodation, and of what description should it be? Happily the Commissioners are not in the dark upon this question, for as far back as the 7th January, 1852, they directed Messrs. Gzowski and Keefer, Civil Engineers, to examine the Harbour and report upon "the best means of enlarging and affording ample accommodation in it for ocean ships drawing 16 to 17 feet at low water; and at the same time, to examine the ground lying between the foot of the current St. Mary and the Lachine Canal, at or near the St. Gabriel Lock with the view of considering the propriety of constructing a Ship Canal to connect these points, and afford the means of building Warehouses on each side of the Canal—with a comparative statement of the value of the land to be acquired, and the probable value of land on each side of the Canal when such work was completed, supposing that the same could be disposed of for the erection of Warehouses;" and these Gentlemen after a thorough survey and examination of the matter in all its bearings, reported on the 28th January, 1853, that they had arrived at the following conclusion:—

"Desirous (say they after reviewing various other plans) of proposing some plan of Harbour enlargement which, without involving so large an immediate outlay as that of the Docks below the 'Cross,' would be at the same time capable of as great ultimate extension and adaptation for all future wants, we turned our attention in the direction of Point St. Charles and the Canal Basins. This neighborhood, being the most convenient for the

Lake and River craft, and about to be put in communication with the Railways connecting with the south, east, and west, seemed the most desirable point for concentration of the sea-going trade. It also possesses the one great requisite for the proposed plan of elevated docks by which sea-going vessels can be brought alongside of permanent Warehouses—namely, a high water level immediately at hand.

"It is known that the Board of Works have constructed the two Locks between the Basin at the Mills and the Harbour with seventeen feet draught of water, for the purpose of allowing sea-going craft to discharge at the basins below Wellington Street Bridge. The lower basin has been excavated to this depth, but the upper one has not, and gives only the ordinary Canal depth of ten feet. The lower basin is small and being overflowed can have no permanent Warehouses upon it. The upper one, if deepened, possesses no accommodation for the sea-going trader;—one side being taken up by the Mills and the other required for the Canal craft.

"The Lachine Canal Locks have a length of two hundred feet, and breadth of forty-five feet, and although we may expect to see longer craft at our wharves before many years, these Locks will pass anything which has hitherto come from sea, and by converting them to the uses for which they were intended, the immediate outlay for longer Locks will be avoided. The Board of Works may abandon their design of deepening the Basin between the second Lock and Wellington Street Bridge, and in fact this cannot be done without undermining the dock walls around this Basin; but it is perfectly practicable, without approaching injuriously near to these walls, to dredge a straight channel one hundred feet wide or more from the second Lock to the proposed site for a Graving Dock, which it is to be presumed from the arrangement of the Locks will be constructed to admit sea-going craft. This channel, a deep-draught vessels could be brought from the Harbour past all the Mills, and from thence could be conducted into Basins or Docks formed either on the land in rear of the Emigrant Sheds, or in the River upon the Point St. Charles shoals. The latter plan has the advantage that it can hereafter be made independent of the Canal Locks by the construction of others of the largest class connecting these new Docks with the Harbour outside of Windmill Point. The outer wall enclosing these Docks would not be available for Warehouses on account of its exposure; but sufficient accommodation could be provided on the shore side and upon interior division walls. There would be no excavation, no land damages, and deeper water, and therefore lighter traction, than in the inland basins. This work can be constructed in sections, as required; and by a wide canal, cut out of the river bank round Point St. Charles, the whole inside frontage may be built up with warehouses, protected by the width of the canal and its outer bank from ice-shoves. This canal may be extended to the channel between Nuns' Island and the main shore; and by throwing an embankment across the foot of this channel, and another below the outlet of the River St. Pierre, the intermediate space may be filled up with water; forming a basin nearly one mile long, and averaging about $\frac{1}{2}$ a mile wide, with Nuns' Island as a breast-work between it and the river. These embankments would be raised above the highest floods, and would connect Nuns' Island by two permanent bridges with the main shore. The water of this channel would be turned outside of the island; and although the level at the mouth of the St. Pierre River would be raised, it would still be under the ordinary winter level, and no important damage could accrue.

"The cost of deepening the canal basin from the second Lock to the Graving Dock, which would be about \$5,000, should be borne by the Board of Works. The expenditure of the Harbour Commissioners, would commence with the connection of this basin with the new docks in the river, and the construction of the latter. The route of this connection would be through the large waste-weir constructed by the Board—which would simply be transferred farther out, and placed in the walls of the new docks.

"The plan of the dock enclosure would be of the most economical, although efficient character. Two walls of timber crib-work, (partly filled with earth) placed with a space between them, which would be filled with puddled clay, would answer every purpose—and as in time the faces of this work, above the water line, become decayed, they may be cut away and a masonry wall (resting on the timber under water) be substituted.

"We are of opinion, that for about the sum of seventy-five thousand pounds, an additional accommodation of from fifteen to twenty acres of basins and dock-room can be obtained."

With reference to the Report I have just quoted, I beg to say that I have duly considered it, and have carefully examined the Plans in connexion with it, and after mature reflection, have come to the conclusion that, what Messrs. (Gzowski & Keefer have recommended, is the very best practical plan that can be adopted, viz: the construction of Docks in the River upon the Point St Charles Shoals. They have shown, that in an Engineering point of view, there are no difficulties that cannot be overcome, and that it is the most economical of all the plans that suggested themselves to their minds for examination.

On the other hand, with reference to its eligibility in connection with the Commerce of the City, it appears to me to embrace every quality which the Harbour of Montreal demands.

It would bring the largest Sea-going vessels and the largest Inland craft together; it would afford room for Warehouses, where their respective cargoes could be warehoused without cartage, and in the most economical way possible by machinery driven by water; moreover, it would connect both the sea-going and the Inland vessels with the Grand Trunk Railway on Point St. Charles, and no doubt in time, with all the other Railways in the Country—thereby affording a means of warehousing and transhipment not to be surpassed for economical facilities in any Harbour in the world. But, there is still an other view of the matter which carries great weight in my mind, which is this—that the Bridge over the St. Lawrence, (being as it will be a section of the Grand Trunk Railway) will give that Company and those making use of their road, the choice of Portland or Point Levi as sea ports, and hence in my opinion it must become all-important for the interests of Montreal, that the cost of transferring property from one mode or means of conveyance to another, should be reduced to the lowest possible point at which it could be done at either of the aforesaid places. These circumstances appear to me to be very important, for it is well known that the cartage of property and the handling of it by manual labour alone,—particularly the bulky staples of this country,—add greatly to its cost in moving it from one point to another; in fact, I may add that I believe, that the chief cause of Boston's securing so large a share of the trade of Canada, in spite of the competition of her more powerful rival New York, is to be found in the former City possessing warehouses and railway-tracks, so situated as to render cartage with its attendant expenses unnecessary, while New York is not so fortunately situated.

Assuming then that my Colleagues will agree with me as to the necessity of providing further accommodation for sea-going vessels, as well as with reference to the most eligible site for such improvements, I will now refer briefly to the mode in which I think the funds might be raised, which would be required to carry the same into effect.

Messrs. Gzowski and Keefer, as already seen, estimate the cost of 15 to 20 acres of Basins and Dock-room at £75,000; but I would propose to ask for authority to raise £100,000 for the purpose so as to ensure an ample amount. And I would propose to raise that sum by Debentures having a suitable time to run; moreover as the improvements in question would be for the benefit of the Province generally as much as for Montreal, I would ask Government to guarantee the interest on the Debentures, in the same manner as it has already guaranteed the interest on what has hitherto been borrowed to construct the wharves that now exist. If Government should agree to this, then a Bill should be presented to the Legislature at its next Session, with the sanction of Government, asking for the necessary powers; and, if passed, the Works should be commenced as early as practicable next Spring or Summer. But if Government refuse the guarantee referred to, I would still recommend the procuring of an Act from Parliament to authorize the borrowing of money.

Before concluding, I may add that it has not escaped my attention that a very large extension

of the present Harbour accommodation must be made in the course of time in the direction of Hochelaga Bay. For example, the trade in firewood is rapidly increasing, and so also is that in sawn-lumber; and should the Montreal and Bytown Railway be constructed and made to pass out of the City by the East end of the Mountain, it appears to me that in that case Hochelaga Bay will become a large shipping point for the lumber and wood-goods that would be brought from the Ottawa—thereby necessitating the construction of Harbour accommodation at that point. But although this may be found necessary in the course of time; yet, from the fact that no warehouses can be erected there any more than in the preshoves during winter any more than in the present Harbour, it in no way detracts from the necessity which I believe to exist for the construction of Docks upon the Point St. Charles Shoals in connexion with which warehouses to almost any extent could be erected free from that danger.

Hoping my Colleagues will see fit to concur in these views, and adopt my Report,

I am, Sir,
Your obedient Servant,
(Signed,) JOHN YOUNG,
Chairman Harbour Commissioners.
John Glass, Esquire, }
Secretary, }
&c. &c. &c. }

MR. KEEFER'S REPORT OF HIS SURVEY OF THE RIVER SAINT LAWRENCE AND LAKE SAINT PETER, WITH REFERENCE TO THE HARBOUR COMMISSIONERS' OPERATIONS.

(MEMORANDUM.)

The following Report, having been duly considered by the Harbour Commissioners, they resolved thereon as follows:—

"Whereas, it is shown by Mr. T. C. Keefer's Report, of the 25th October last, that it is practicable to deepen the Ship Channel between the Harbour of Montreal and the Sea, to twenty feet at low water, by adopting the Channel known as the South Channel, between Vercheres and Lavaltrie; and whereas, it is desirable that the Ship Channel should be carried to said depth, provided accommodation can be found in the Harbour for vessels drawing such draught of water; and whereas, a scheme of Harbour improvements that would provide ample accommodation for such vessels: therefore, Resolved, That they deem it expedient to adopt the policy of deepening the Ship Channel to twenty feet at low water, and of carrying the same into effect as early as practicable, provided they are enabled at the same time to carry out the scheme above referred to for improving and enlarging the Harbour."

(Certified,) JOHN GLASS,
Secretary.

(COPY)
MONTREAL, 5th October, 1853.

Sir,—I have the honor to report, that I have completed the examination of the River St. Lawrence at such points as obstructions to a navigation for twenty feet draught of water were anticipated, or known to exist. It may be proper that I should repeat here the reasons which made such an examination necessary.

It will be remembered that on the 24th August, a vessel was taken down from Montreal, having a draught of water greater by four feet than the depth upon the Flats in Lake St. Peter. This vessel was in charge of a competent Pilot, and navigated in the deepest channel known to the Pilots, and established by their marks. Although she passed Lake St. Peter without grounding, she touched the bottom at four points above Lake St. Peter, viz., at "Varennes," "Isle la Bague," "St. Sulpice," and above and opposite the Island of "Lavaltrie." In consequence of the foregoing, the Superintendent of the Lake St. Peter Works, who was on board of the "California" when she touched at the above points, notified the Harbour Commissioners that, if, as was probable, the dredging operations above Lake St. Peter had to be extended beyond former anticipations, early preparations in the shape of a new Dredge, adapted to the bottom to be removed (which is harder than that in Lake St. Peter, and cannot be worked by the Dredges employed there), must be made. The letter of Capt. Bell having been referred to me, I advised an examination of the River with the following objects in view:—

1st. To ascertain whether the channel, as navigated by the Pilots, really was the one in which the deepest water was to be found, and if there were any obstructions, such as currents, shoals, crooked or narrow features, which prevented the use of deeper channels, if such existed.

2nd. To examine into the nature and extent of the obstructions in the Pilots' channel, and to compare them with those in any other channel which might be found, with a view of determining upon which route our efforts should be directed, in order to obtain the most economical channel for the ocean trade with Montreal.

3rd. The scale of navigation under the present plans contemplated by the Harbour Commissioners being for a depth of 17 feet at low water, it was desirable to ascertain what difficulty existed elsewhere than in Lake St. Peter, to extending the depth to 20 feet at low water, should the commerce of the Port hereafter warrant such an attempt. The success which has attended the operations in Lake St. Peter makes the deepening of that great barrier to the trade of Montreal a matter of time and money only, both of which may be estimated with all necessary accuracy. As it was very probable that the deepening of Lake St. Peter would not stop at the gauge of 17 feet, provided the known cost of further operations in this Lake were the only or principal barrier to bringing up the largest class of ocean vessels to Montreal—it became desirable to ascertain the extent of all other obstructions in order that if these were light it might be determined to remove them to a greater depth than 17 feet rather than return to them a second time, inasmuch as a great part of the expense of removing these detached shoals consists in bringing the dredges on the ground and mooring them.

Upon an examination of Bayfield's charts it did not appear that there was any want of water at many of the points where vessels had touched in the Pilots' channel. The Pilots' channel had been in use previous to the survey made by Bayfield and has not been changed, because although not in the deepest water it contained a depth sufficient for any vessel which could get over the Flats in Lake St. Peter. As this depth is to be found in many parts of the river "in shore," the Pilots have naturally "followed the land" and upon that side of the River with which they were best acquainted, or, probably, which was earliest and most extensively inhabited.

Upon the appearance of such vessels as the "California," drawing by several feet more water than in any previous year, it became evident from the fact of her touching at many points where vessels had never touched before, that if the Pilots' channel were the best which could be obtained it would be necessary to pause and examine the extent of these new obstructions before even the present scale of navigation contemplated by the Commissioners should be persevered in, because there was good reason to suppose that when Lake St. Peter was deepened to 17 feet instead of sixteen feet as at present, the existing, or Pilots' channel, would be impassable.

Upon procuring a set of Bayfield's charts, "corrected to 1848," upon which the lights and bearings have been marked down, it became evident from inspection that the channels navigated, as indicated by these lights and bearings at two important points in the River, were not in the natural channel of the River as indicated by Bayfield's charts. The recent examination of the River, therefore, was not for the purpose of making a survey *de novo* which would have taken years, but to ascertain whether the channels as indicated by Bayfield were still in existence—whether any unfavorable changes had taken place in them within the twenty years which have elapsed since that survey, or whether there were substantial local causes, currents, &c., which caused their neglect. I may here observe that it is questionable whether the Pilots' have seen Bayfield's charts, which, as engraved for that portion of the River between Montreal and Quebec, are upon too small a scale to be of any practical service.

The results of the present survey, however gratifying they may be, cannot be considered unexpected, as they have proved rather a confirmation of the accuracy of Bayfield, than developed any new discovery. These very full explanations are made, in order that the object of the survey should not be misunderstood, or its scope overrated. Within the time allotted it was not possible to make very minute and expensive surveys, and fortunately such were not required. When our course was arrested by striking the bottom, the examination was continued until it was settled whether it was a

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I am about to prepare large charts of the river between Montreal and Quebec, which will show at a glance the position and extension of the obstructions to a navigation of 17, 18, 19, and 20 feet depth at low water. Without these charts it is impossible to convey a correct idea of what is required. I will, however, proceed to state what has been done, and what in my judgment remains to be done.

The steamer used for the service was provided with two good boats and crews—spars of 30 to 35 feet in length, sounding poles, boring auger, long light lines for measuring, &c. Stout spars were forced down twenty-one feet below the water surface, (the depth upon the flats at this time being twelve feet), and firmly secured. The first place where the spar struck the ground in the channel here was below Pointe aux Trembles, at the head of Isle St. Therese. The ship channel here passes between Isles L'aigne and St. Therese; and as there are two other channels, the one upon the south and the other upon the north, respectively, of the above Islands, this division of the waters has caused a bar which closes the entrance to all of these channels. Upon sounding in small boats, this bar was found to be extremely narrow, and having an average exceeding 20 feet of water; but in consequence of a detached "lump" in the centre of the channel with about 17 feet at low water, if a greater depth than this is entered upon, it will be necessary to pass the dredge once over this point, as the obstruction is too small for measurement, and not worth the expense of buoying off.

Descending to Varennes, we found that the "poulier" on which the California touched was on the south side of the channel. In this, as in similar cases, a buoy should be moored until the Pilots can revise their marks for the deeper draught. From Pointe aux Trembles to Lavalltrie the whole of the middle or present ship channel was examined in small boats. The characteristic of the middle channel from Varennes to Lavalltrie, is that of a generally good width and depth, but embracing numerous shoals in all positions, nearly all of which have about fifteen feet at lowest water in summer, and have not therefore offered any obstruction to the ancient draught of water. The most confined part of this channel is that abreast of Isle a la Bague, where we measured the width between the lines of 17 feet at lowest water, and found it to be two hundred and thirty feet. This measurement is valuable, as shewing that a channel of such width where straight is practicable. The most objectionable feature of the middle channel, from Isle De Lorie, St. Laurent, or Laurette, as it is called, below Varennes, to the north shore below Isle a la Bague, is that it is subjected to a strong cross current, pouring out of the Bout de L'isle channel of the Ottawa; the greater part of which water crosses the ship channel, and passes on the South Shore, or by Vercheres.

If the present Channel be maintained for the increased depth of 17 feet at low water, dredging at several points between Varennes and Lavalltrie will be necessary; and in addition, a good system of buoys and additional lights, if navigated by night. Before proceeding to examine more minutely the many obstructions in the present channel, I turned to that on the South Shore by Vercheres, where it was evident from inspection, that by far the greater portion of the water flowed. The examination of this channel showed, that even in its present state, it is navigable for vessels of the deepest draught throughout, and that there is only one point in it where improvement is desirable. This is under Cape St. Michael, between Isles Delorier and Bellegarde, where there are two channels, the deepest of which has a narrow passage for a distance of one or two hundred yards. A few weeks work of a dredge will make this channel wider than that used at present—and one Summer's work would make it all that could be desired. In addition to its great depth of water, so advantageous to the tugs, the South channel follows a high, bold shore throughout, making its navigation by night or day unattended with difficulty.

The next point is Lavalltrie, where no improvement can be made in the present channel, which should however be widened without delay. An estimate of the amount of dredging for different depths at this point, will be furnished with the Chart. No examination was made between La Noraye and Lake St. Peter, as both Charts, Pilots, and the character of the river, indicated abundance of water between these points.

Lake St. Peter was examined, with a view of determining the quantity of work necessary for

greater depths than 17 feet, and also for the purpose of testing the direction of the artificial channel as compared with the deep pools above and below it. I reserve my remarks upon this Lake until the completion of the Winter survey on the ice, for which preparations have been made.

Learning that there were two points below Three Rivers, where vessels of 16 feet draught would be arrested, I proceeded to examine them. The first is the "Poulier Provenche," a short distance below the mouth of the River St. Maurice, and quite upon the north shore. The Pilots' channel here runs over a shifting sand bank with sixteen feet water, and sometimes less. A proof that they are not in the natural channel, the present Ship channel over the "Poulier Provenche," is in the dark coloured waters of the St. Maurice—The blue water of the St. Lawrence keeping the centre and south shore. On examining the south shore a broad channel with nowhere less than 30 feet of water was found as indicated by Bayfield. I would recommend that this channel be at once brought into use.

The last obstruction is at Cape Roche, opposite St. Anne. Here there is undoubtedly less water than indicated by Bayfield, but as there is a spring tide of at least six feet, and neaps of at least four, by waiting for high water, no fear of striking, for vessels of 20 feet draught, need be entertained. Above Pointe a Livar there is a narrow bar stretching across the channel, with but sixteen feet at low tide. Upon boring, this bar was found to consist of stiff blue clay. Near Cape Roche the soundings are very irregular—no regular bar exists as is evident from the width of the channel between the banks, but lumps of stiff clay and detached stones are scattered over the bottom which if encountered will at low water take the copper off the vessel.

Considering the lightness of the work to be done, I have no doubt that these obstructions will be removed, and that the expense will be warranted in order to obviate the necessity of waiting for high water with vessels of deeper draught than those which now come up.

Borings made at Lavalltrie, in the south channel and below Pointe aux Trembles, displayed a soft tenacious clay which affords no obstacle to dredging.

I have the honor to be,

Sir,

Your obedient Servant,
(Signed,) THOMAS C. KEEFER,
Engineer Harbour Commissioners.

JOHN GLASS, Esq.,
Secretary,
Harbour Commissioners.

(Copy.)

REPORT ON THE PROPOSED ENLARGEMENT OF THE MONTREAL HARBOUR.

MONTREAL, January 28th, 1853.

To the Harbour Commissioners of Montreal:

GENTLEMEN,—In obedience to your instructions, dated the 7th of January, 1852, we beg leave to submit the following Report, upon "the best means of enlarging and affording ample accommodation in the Harbour of Montreal for Ocean Ships drawing sixteen to seventeen feet of water."

You suggested to us "the propriety of examining the ground lying between the foot of the Current and the Lachine Canal, at or near the St. Gabriel Lock, with the view of considering the propriety of constructing a ship canal to connect these points, and thus affording the means of building warehouses on each side of the Canal," and called for "a comparative statement of the value of the land and houses to be acquired, with the probable value of land upon each side of the Canal, when such work is completed, supposing that the same could be disposed of for the erection of storehouses."

A survey was therefore made, the result of which is shown upon the plan and profile herewith transmitted, from the Cote St. Paul and the St. Gabriel Locks, by the route of Bonaventure and Craig Streets to the Cross, and also to the outlet of Ruisseau Migeon.

The result of this survey proves, as might have been anticipated, the entire practicability of extending the Lachine Canal through the town, and of forming basins upon which warehouses could be erected, so that the execution of this scheme is one of cost and expediency.

Three levels were carried through the town, in order to ascertain which would be the most applicable to the profile of the route, viz., one from the level of the Canal water under each of

the bridges, at the Cote St. Paul Lock, at Brewer's Basin, and at Wellington Street.

The higher of these levels, that above the Cote St. Paul Lock, is too elevated to be made use of as an open canal—as the water would in that case stand some twenty feet over the level of Craig Street at the Haymarket. It might, however, be employed on account of the superior pressure it would afford, and the smaller pipe which could be used in the event of water being taken through the town in cast iron pipes for the purpose of supplying basins formed below the Victoria Road.

The second level, that from above the St. Gabriel Lock, would be the most economical one, as it would place the levels generally in such a position as to call for the least excavation in forming the canal through the town, but as it would place the water line some ten feet over Craig Street, it would be inconvenient for the street crossings—and would expose a great portion of the city to be flooding in the event of a breach or leak.

The third level, although more expensive in the excavation, is on all points the most desirable for carrying out the project of an extension through the town for the following reasons:—

By this plan the extension would leave the Lachine Canal at the Seminary Basin above Wellington Street Bridge, and passing to the north of the Lachine Railway terminus, would thereby avoid this Railroad, which would not be the case if the departure were made above the St. Gabriel Lock.

2ndly. It would pass through the city with a water level about as high as Craig Street at its intersection with St. Urbain Street—and involve the least inconvenience in the crossings of the streets.

3rdly. This level could be connected with the River at Hochelaga Bay, or at Ruisseau Migeon, by means of two Locks only,—whereas any higher level would involve three Locks, the lockage of which must be taken by every vessel coming into dock by this plan.

In addition to its great expense, the Canal through the town, however carefully constructed, would seriously interfere with the drainage and sewage of the city—would injure existing cellars, and cut off the whole present system of gas and water pipes—placing the business portion of the city upon an island, and to give sufficient width to moor vessels on either side without obstructing the centre channel, a great width must be excavated, and some difficulty would be experienced to get rid of this large amount of excavation. We are not therefore prepared to recommend the adoption of this scheme, and have not felt authorized to enter into complicated and laborious estimates and plans necessary for the purpose of even approximating to the cost of such an undertaking.

The principal reason assigned in our instructions for this project are for the purpose of "affording means of building Warehouses on each side of the Canal"—In short for accommodation similar to that which would be afforded by the Upper Canal Basin if deepened for the entrance of sea-going craft.

In view of the probability that the great expense of, and the many obstacles to, continuous Canal extension—it became our duty to consider how far the above object might be secured by carrying the necessary supply of water from a high level through the Town in pipes for the purpose of forming a Reservoir to work docks placed on the vacant ground, north of the Victoria Road.

The construction of docks below the Victoria Road to be worked by water brought under ground from the Canal, while it would meet the wants of the Port, admits of a far more economical arrangement, and the whole plan is under much better control than would be that of the Canal extension. In the latter case the levels of the docks below the Victoria Road would be established not by the ground on which they were placed, but by the particular level to which was most adapted to passing the Town. Whereas by bringing down the required water in pipes any level which proves the most convenient and economical may be adopted. The best arrangement in this case would be to place the dock level, so that the excavation will be only what is required to make the surrounding embankments; and this condition of the ground determines the proper point for the dock entrance from the River. It is very desirable that the levels of the docks should be no higher than is sufficient to place them beyond the reach of the highest winter flood of the River; and this is as near as possible the same level as that of the Canal basins

at the Mills, and will require two locks to maintain communication with the River.

In order to shorten the route, place the docks as near the town as possible, and obtain the advantages afforded by Hochelaga Bay, the line from the Cote St. Paul lock terminated at this bay—but the height of the natural surface opposite this point, calls for a water level at least as high as that above the St. Gabriel lock, and would therefore make three locks necessary for the connection with the River. The abruptness of the ground would make combined locks advisable, and therefore, every vessel would be subjected to the additional lockage of one lock before she could be brought alongside of the warehouses,—which latter would be, in this case, placed some ten feet higher than is necessary for the purpose of avoiding the river floods.

The survey, therefore, was extended down to Ruisseau Migeon, which route affords every choice of ground, and is admirably adapted for the construction of extensive and economical basins approachable from the River with the least amount of lockage. The ground between the "Cross" and Ruisseau Migeon, for a distance of three-fourths of a mile in the line of the basins,

is the first which can be reached sufficiently low to admit of their economical construction and advantageous arrangement in relation to the River.

The locks would be combined and placed at the River bank, the entrance being nearly at right angles to the Quebec road, from which they would extend back in the same direction about one-fourth of a mile, and then turn up following the low ground, running nearly parallel with the river at this distance. From the "Cross" up, the ground is too high for basins without the use of another lock, by means of which they may be brought as high up as Viger Square; if found desirable.

The distance from the Cote St. Paul Lock to Ruisseau Migeon is about $6\frac{1}{4}$ miles; from the St. Gabriel Lock, or the Seminary Basin, about $4\frac{1}{2}$ miles; to the Cross the distance would be about three-fourths of a mile less. The shortest line of pipe which could be used for the supply of the Basins, would be taken from the St. Gabriel Lock—and it would not be necessary to continue the pipe beyond the Victoria Road, below which point an open conduit may be employed, if, as is probable, it proves the cheaper mode. This would call for about two miles of iron pipe, which, as it

would feed a storing reservoir, need not be of larger dimensions than would supply the loss from evaporation, leakage, &c., and restore at night the reservoir head drawn down by lockage during the day.

The cost of carrying out this plan, can only be determined by defining the amount of Dock accommodation; and, without going into details, we are of opinion, that nothing in the way of additional accommodation—with the largest class of locks, and the full depth of water—could be effected short of an outlay of £100,000. Although the time may not be far distant when the construction of docks below the "Cross" will be desirable, at present this site would be inconveniently distant, and only valuable as an "Entrepôt," where goods from Sea or Inland to be forwarded up or down, would change craft; and it would be removed from the Railway connections and the Bridge which must be above the Harbour.

(Signed.) C. S. GZOWSKI.
THOS. U. KEEFER.

Note.—The remainder of this Report has been already published, being incorporated in that of the Hon. John Young, published on the 26th inst.

Graph Tiffin Esq

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